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STEP
24.1700
11.3900

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B101/B186

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TITLE: Apparatus for measuring the sonic velocity in liquid metals and melts

PERIODICAL: Leningrad. Universitet. Vestnik. Seriya fiziki i khimii, no. 4, 1962, 52-55

TEXT: An apparatus working on the principle of electroacoustic feedback, able to measure ultrasonic velocity with the transducers in fixed positions is described here. Instead of the ultrasonic propagation velocity, the pulse repetition frequency is measured, i.e. the ultra-sound which has passed the test medium, is amplified, shaped, and again starts up the master pulse generator. The ultrasonic velocity is determined by $c=d/(1/f + \tau_\Sigma)$, where d is the distance between the vibrators, f the pulse repetition frequency, τ_Σ the total electric and acoustic delay. To allow operation over a wide range of temperature the measuring cell has two delay rods. To eliminate the effect of the temperature gradient occurring in the delay rods,

Card 1/2

the ultrasonic propagation velocity is measured not only passing through the system but also in the reflection from the rod-fusion interfaces. $c = 2dff_1f_2/(2f_1f_2 - ff_1 - ff_2)$, where f_1 and f_2 is the pulse repetition frequency in the two rods. The distance d is calibrated by a liquid of known sound conductivity. The pulse generator delivers negative pulses of 3 μsec duration, 150 v amplitude, starting up a shock generator. Measurements are made with the precisely fixed frequency of 5 Mc/sec. The delay rods consist of fine-grained 1Х18Н9Т (1Kh18N9T) steel. A check of the ultrasonic velocity in mercury between -39.2 and +70°C showed good agreement with the data found by O. J. Kleppa (Ultrasonic velocities of sound in some liquid metals. Adiabatic and isothermal compressibilities of liquid metals at their melting points. Journ. Chem. Phys., 18, 1331, 1950) and E. B. Freyer, J. C. Hubbard, D. W. Andrews (Sonic studies of the physical properties of liquids. Journ. Amer. Chem. Soc., 51, 759, 1929). There are 1 figure and 1 table.

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Card 2/2